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AUTHOR Gibbons, Michael
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ABSTRACT

The Mathematics Improvement Component (MIC) was first implemented in the Columbus (Ohio) Public Schools in 1987-88 to assist elementary and middle school pupils who were low achievers in mathematics. Three programs comprised the 1989-90 MIC: the Elementary Computer Assisted Instruction (Elem-CAI) Program, the Elementary Competency Based Education (Elem-CBE) Program, and the Middle School Competency Based Education (Middle-CBE) Program. In the first program, selected students were served an average of three times per week in computer-assisted instruction (CAI) labs, and classroom teachers delivered additional individual and small-group instruction. In both MIC-CBE programs, selected pupils were administered tests periodically that provided objective-based mastery information related to the Columbus district's course of study. All three MIC programs included ongoing diagnosis of mathematics difficulties and assessment of pupil progress based on the cooperative efforts of the program teachers and the classroom teachers. The three programs combined to serve 2,050 students in 31 elementary schools and 12 middle schools with the assistance of 44 teachers. (Besides the pupil census information, this report contains the following: standardized achievement test results; potential retainee/course failure information; and appendixes which include parental involvement surveys, inservice evaluation questionnaires, computer census tallies, and the process evaluation logs that were compiled by supervisors.) (JJK)

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Elementary and Secondary Education Act - Chapter 1

FINAL EVALUATION REPORT
MATHEMATICS IMPROVEMENT COMPONENT:
ELEMENTARY COMPUTER ASSISTED INSTRUCTION PROGRAM, ELEMENTARY COMPETENCY BASED EDUCATION PROGRAM, AND MIDDLE SCHOOL COMPETENCY BASED EDUCATION PROGRAM

March 1991

Written by:

Michael Gibbons
Professional Specialist

Under the Supervision of:
E. Jane Williams, Ph.D.

Data Analysis by:
Kathy Morgan

Under the Supervision of:
Richard A. Amorose, Ph.D.

Columbus (Ohio) Public Schools
Department of Program Evaluation
Gary Thompson, Ph.D., Director

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Elementary and Secondary Education Act - Chapter 1

FINAL EVALUATION REPORT
MATHEMATICS IMPROVEMENT COMPONENT:
ELEMENTARY COMPUTER ASSISTED INSTRUCTION PROGRAM, ELEMENTARY COMPETENCY BASED EDUCATION PROGRAM, AND MIDDLE SCHOOL COMPETENCY BASED EDUCATION PROGRAM
1989-90

ABSTRACT

Program Descriptions: The Mathematics Improvement Component (MIC) served 2,050 pupils, with a goal to improve the skills and achievement levels of pupils who were low achievers in mathematics. Three programs comprised MIC: the Elementary Computer Assisted Instruction Program, the Elementary Competency Based Education Program, and the Middle School Competency Based Education Program. In the first program, selected pupils were served in computer-assisted-instruction (CAI) labs. The MIC-CAI program teachers provided individual and small-group instruction in addition to drill and practice sessions on the computers. In the MIC-CBE programs, selected pupils were administered tests periodically which provided objective based mastery information related to the districts' Course of Study. At the elementary level, pupils were served an average of three times a week, while at the middle school level, pupils were served an average of two times a week. In all programs selected pupils were permitted to move in and out of the program as needed during the school year.

In 1989-90 the MIC programs were implemented by 44 teachers in a total of 43 schools—31 elementary schools and 12 middle schools. The MIC-CAI program served a total of 20 elementary schools. The MIC-CBE program served a total of 23 schools, 11 at the elementary level and 12 at the middle school level.

Time Intervals: For evaluation purposes the MIC programs started on September 18, 1989 and continued through March 30, 1990. This interval of time gave 126 days of possible program instruction. Students included in the final pretest-posttest analyses must have been enrolled at least 30 days and attended the program at least 80% of their instructional period. The number of enrollment days and instructional days varied from pupil to pupil.

Activities: Implementation of the MIC programs was accomplished through instructional activities to strengthen and extend regular classroom instruction. Instructional techniques and materials based on skill-centered objectives and coordinated with the Columbus Course of Study (COS) objectives were designed to fit individual pupil needs.

Desired Outcomes: Both MIC-CAI and MIC-CBE programs shared three desired outcomes. Desired Outcomes 1 and 2 were evaluated by achievement testing which measured pupil performance in mathematics skills. The two achievement outcomes required that at least 50 percent of the pupils in the samples—those who met the attendance criterion, were English speaking, and had a pretest-posttest score for Total Mathematics or a pretest-posttest score for Mathematics Concepts and Applications—would gain at least 3.0 normal curve equivalent points for the instructional period in each program. Desired Outcome 3 stated that at least 35% of the pupils who were enrolled at least 30 days and attended the program at least 80% of their instructional period and who were identified as being in danger of being retained/failed would not be retained/failed.

Evaluation Design: The two desired outcomes dealing with gain in NCE points were evaluated through the administration of the Comprehensive Tests of Basic Skills (CTBS, 1981) at grades 3-8. Analyses of the pretest to posttest data were primarily in terms of NCE change scores and percentages of pupils by grade and by evaluation samples meeting criterion for the NCE point gain of 3.0. The other desired outcome was evaluated by means of a locally constructed instrument.

Major Findings: Major findings are presented separately for the MIC-CAI and MIC-CBE programs.

MIC-CAI program. Analyses of pupil census data indicated a total of 697 pupils in grade 3-5 were served by the 22 half-time MIC-CAI teachers. The average number of MIC-CAI pupils served during the school year per teacher was 31.7. The average number of MIC-CAI pupils enrolled per teacher on any given day was 22.0. The average amount of instruction per week was 3.1 hours. The average hours of

instruction per week varied only slightly from grade level to grade level and ranged from 3.0 to 3.1 hours.

The evaluation sample for Total Mathematics consisted of 522 pupils in grades 3-5. Analyses of the Total Mathematics scores indicated an average change of 10.5 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in Desired Outcome 1. The evaluation sample for Mathematics Concepts and Applications consisted of 517 pupils in grades 3-5. Analyses of the Mathematics Concepts and Applications scores indicated an average change of 5.7 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in Desired Outcome 2.

Early in the school year, teachers identified 82 (14.6%) pupils of the 560 program pupils listed, as being potential retainees. At the end of the school year, 69 of the 82 (84.1%) pupils identified, were not retained in grade, far exceeding the criterion of 35.0% specified in Desired Outcome 3. Positive ratings were given by MIC-CAI teachers to Chapter 1 inservice sessions in which they participated. Overall ratings for questions ranged from 4.6 to 4.7 on a scale of 1.0 (Strongly Disagree) to 5.0 (Strongly Agree). MIC-CAI teachers reported contact with parents and hours spent in five different activities at the end of each month. They reported a total of 1311.4 contacts with 435 parents of program pupils involving 881.0 parent hours.

Process evaluation, including on-site visitations to 11 of 22 MIC-CAI labs indicated that the areas of Parent Involvement and Testing received lower average ratings by teachers than such areas as Class Scheduling and Materials Provided for Program. The MIC-CAI teachers also gave consistently high ratings to the area of Facilities. In addition, a questionnaire surveying computer systems used in MIC-CAI labs showed that pupils worked at their computer stations an average of 45.4% of their instructional time.

MIC-CBE program. Analyses of pupil census data indicated a total of 1353 pupils in grades 3-8 were served in the 11 elementary schools and 12 middle schools in the MIC-CBE program. Of the 1353 pupils, 522 were in elementary schools and 831 were in middle schools. The average number of pupils served during the school year per teacher was 61.5. The average number of pupils enrolled per teacher on any given day was 23.6. The average amount of instruction per week was 1.7 hours. The average hours of instruction per week varied by grade level and ranged from 1.4 hours for grades 6-8, to 2.2 hours for grade 4.

The evaluation sample for Total Mathematics consisted of 585 pupils in grades 3-8. Analyses of the Total Mathematics scores indicated an average change of 11.0 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in Desired Outcome 1. The evaluation sample for Mathematics Concepts and Applications consisted of 584 pupils in grades 3-8. Analyses of the Mathematics Concepts and Applications scores indicated an average change of 7.4 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in Desired Outcome 2.

Early in the school year, teachers identified 189 pupils or 29.6% of the 638 program pupils listed, as being potential retainees/course failures. At the end of the school year, 130 of the 189 pupils identified, or 68.8%, were not retained in grade or failed, far exceeding the criterion of 35.0% specified in Desired Outcome 3. Positive ratings were given by MIC-CBE teachers to Chapter 1 inservice sessions in which they participated. Overall ratings for questions ranged from 4.6 to 4.8 on a scale of 1.0 (Strongly Disagree) to 5.0 (Strongly Agree). MIC-CBE teachers reported a total of 1651 contacts with 739 parents of program pupils involving 940.5 parent hours.

Process evaluation, including on-site visitations to 20 of 22 MIC-CBE labs, indicated that, similar to the MIC-CAI teachers, the areas of Parent Involvement and Testing received lower average ratings by teachers than such areas as Class Scheduling and Materials Provided for Program. However, MIC-CBE teachers gave lower ratings to the area Facilities than did the MIC-CAI teachers.

Recommendations: Programs to improve mathematics skills should be continued with additional efforts made to improve upon the shortcomings of the present and previous programs.

Elementary and Secondary Education Act - Chapter 1

FINAL EVALUATION REPORT
MATHEMATICS IMPROVEMENT COMPONENT:
ELEMENTARY COMPUTER ASSISTED INSTRUCTION PROGRAM,
ELEMENTARY COMPETENCY BASED EDUCATION PROGRAM, AND
MIDDLE SCHOOL COMPETENCY BASED EDUCATION PROGRAM

December 1990

Program Descriptions

The Mathematics Improvement Component (MIC) was first implemented in the Columbus Public Schools in 1987-88 to assist elementary and middle school pupils who were low achievers in mathematics. In 1989-90 MIC was in its third year of operation. The overall purpose of MIC was to improve the mathematics skills and levels of achievement of pupils selected for service in priority schools.

Funding for MIC was provided by Chapter 1 of the Elementary and Secondary Education Act (ESEA). Prior to MIC, the Basic Math Improvement Program (BMIP) operated in the Columbus Public Schools from 1966 to 1982 with funding from Title I of the Elementary and Secondary Education Act.

Three programs comprised the 1989-90 Mathematics Improvement Component: the Elementary Computer Assisted Instruction (Elem-CAI) Program, the Elementary Competency Based Education (Elem-CBE) Program, and the Middle School Competency Based Education (Middle-CBE) Program. In the first program, selected pupils were served an average of three times a week in computer-assisted-instruction (CAI) labs. The MIC-CAI program teachers delivered individual and small-group instruction in addition to drill and practice sessions on the computers. In the MIC-CBE programs, selected pupils were administered tests periodically which provided objective based mastery information related to the district's Course of Study. At the elementary level, pupils were served an average of three times a week, while at the middle school level, pupils were served an average of two times a week. In both the MIC-CAI and MIC-CBE programs, selected pupils were allowed to move in and out of the program as needed during the school year.

All three MIC programs included ongoing diagnosis of mathematics problems and assessment of pupil progress based on the cooperative efforts of the program teacher and the classroom teacher. Program planning was accomplished in cooperation with the mathematics personnel of the school district. Instruction was coordinated with the pupil's regular classroom teacher and the Columbus Course of Study (COS). The MIC teachers received support from a full-time program coordinator and inservice meetings.

In 1989-90 the MIC programs were located in a total of 43 schools--31 elementary schools and 12 middle schools. Of these, the MIC-CAI program served a total of 20 elementary schools. The MIC-CBE program served a total of 23 schools, 11 at the elementary level and 12 at the middle school level.

In this report the two Competency Based Education programs (MIC-CBE) generally are treated as one and are discussed separately from the MIC-CAI program. However, the MIC programs are treated as a whole for the purpose of discussing certain features that are common to all three programs (e.g., aspects of the evaluation design). The MIC programs are described in more detail below.

Elementary Computer-Assisted Instruction Program (MIC-CAI)

Each MIC-CAI program teacher was located in a computer-assisted-instruction (CAI) lab equipped with microcomputers or minicomputers. The teacher was provided instructional materials, software, and a computer-management system. An instructional aide generally was assigned to each elementary lab. Instruction was individualized to meet the needs of each pupil.

The lab was used approximately a half-day each for the MIC-CAI program and the Compensatory Language Experiences and Reading (CLEAR-CAI) program. The teacher served half-time in each program. Evaluation of the CLEAR-CAI program is available in a separate report (Lore & Chamberlain, 1990).

Selected pupils normally received instruction in groups of eight to 10 for at least three 40-minute periods of instruction every five school days for the entire school year. According to the program guidelines, pupils could not be pulled from the regular classroom during reading or mathematics classes. Scheduling arrangements varied from school to school, however. About half of the teachers, for example, provided instruction for pupils each day of the week.

In 1989-90 the MIC-CAI program served selected pupils in grades 3-5 in a total of 20 buildings. Program staff consisted of 22 teachers. With the exception of two elementary schools, each building was staffed by one program teacher. Two elementary schools were each staffed by two program teachers.

Competency Based Education Program (MIC-CBE)

A key feature of both the MIC-CAI and the MIC-CBE programs was the flexibility to move selected pupils in and out of the program as needed during the year. Need was determined by pupil performance on formative tests administered at the end of each chapter by the classroom teacher. The tests were designed by a team of classroom teachers to reflect the textbook and the Columbus Course of Study (COS) objectives. Intervention followed the formative assessment. After pupils received instruction they were retested periodically on the COS objectives that were not mastered on the classroom chapter test.

According to the program guidelines, pupils were to receive instruction in groups of 6 for at least three 40-minute classes every five school days at the elementary level and groups of six for at least two 40-minute classes every five school days at the middle school level. Approximately 36 students could be served during the six periods per day by each MIC-Elem-CBE teacher, and approximately 30 students could be served during the five periods per day by each MIC-Middle CBE teacher. In a few schools the service delivery pattern varied slightly from the norm.

In 1989-90 the MIC-CBE program served selected pupils in grades 3-8 in a total of 23 schools, 11 at the elementary level and 12 at the middle school level. Program staff consisted of 22 teachers, 10 at the elementary level and 12 at the middle school level.

Evaluation Objectives

The desired outcomes for both the MIC-CAI and MIC-CBE programs were as follows:

At least 50% of the pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period will gain at least 3.0 normal curve equivalent (NCE) points for the instructional period in total mathematics. Gain will be measured by a nationally standardized achievement test of mathematics.

At least 50% of the pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period will gain at least 3.0 normal curve equivalent (NCE) points for the instructional period in mathematical concepts and applications. Gain will be measured by a nationally standardized test.

At least 35% of the pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period and who are identified by their classroom teacher on or before December 1, 1989 as being in danger of being retained will not be retained (grades 3-5) or as being in danger of failing the course in which mathematics instruction occurs will not fail (grades 6-8).

The program time period established for evaluation purposes for the MIC programs was 126 school days beginning September 18, 1989, and ending March 30, 1990. For the MIC programs, analysis of pretest-posttest performance was contingent on pupil enrollment for a minimum of 30 days and pupil attendance for at least 80% of their instructional days. Days of enrollment in the MIC programs were counted from the day after the first chapter test was given to qualify the pupil through the day of the chapter test indicating the pupil no longer needed treatment. Some MIC pupils may have had more than one enrollment period. The number of enrollment days and instructional days varied from pupil to pupil in the MIC programs.

Evaluation Design

The evaluation design for the MIC programs provided for the collection of data in five areas. Also, data were collected in two additional areas, computer usage in the MIC-CAI program and a process evaluation conducted in both the MIC-CAI and MIC-CBE labs. The instruments used to collect the data are found in Appendix A, with the exception of the standardized achievement tests.

1. ESEA Chapter 1 Pupil Census Information

   A locally-developed Pupil Census Form (PCF) was completed by program teachers for each pupil served to provide the following information: days of program enrollment, days of program attendance, and hours of instruction per week. The form also included information regarding the pupil's grade and sex, whether or not the pupil was non-English speaking, and whether or not the pupil left the ESEA Chapter 1 program because he or she qualified for a special education program. Also included was a question regarding the pupil's progress which required a subjective response from the program teacher. Collection of PCFs was completed in April 1990. See page 37, Appendix A, for a sample PCF.

2. Standardized Achievement Test Information

Program pupils were administered the two mathematics tests of the Comprehensive Tests of Basic Skills (CTBS, 1981). The two tests, Mathematics Computation and Mathematics Concepts and Applications, also yield a combined score for Total Mathematics. This test series, which is published by CTB/McGraw-Hill, has empirical norms for fall and spring, established October 5-10, 1980, and April 27 to May 1, 1981, respectively. For evaluation purposes scores from the two tests, Mathematics Concepts and Applications and Total Mathematics, were used. A Spring to Spring testing schedule was employed, with the pretest administered April 3-14, 1989, and the posttest administered March 26-April 10, 1990. The levels and forms of the test used for each grade level, for both the pretest and the posttest, for pupils not retained are summarized in Table 1.

Table 1

CTBS Test Levels and Forms
by Grade Level

Pretest, Spring 1989			Posttest, Spring 1990		
Grade	Level	Form	Grade	Level	Form
2	D*	V*	3	E	V
3	E	V	4	F	V
4	F*	V*	5	G	V
5	G	V	6	G	V
6	G	V	7	H*	V*
7	H*	V*	8	H	V

*Customized Tests of Mathematics provided estimates of performance on this CTBS test.

All testing was done on level. Customized tests that provided norm-referenced as well as criterion-referenced scores were administered at grades 2, 4, and 7 for the pretest, and at grade 7 for the posttest. The customized tests were developed by Columbus Public Schools personnel in cooperation with CTB/McGraw-Hill to achieve a closer correlation with the Columbus Public Schools' Graded Course of Study (COS). Both pretest and posttest were administered by classroom teachers, with program teachers serving as proctors, as part of the Districtwide Testing Program.

3. Potential Retainee/Course Failure Information

The locally developed Potential Retainee Record Sheet was designed to identify elementary school pupils in danger of being retained for this school year. Information concerning possible retention was collected by program teachers from the pupils' regular classroom teachers and recorded on the instrument by December 1, 1989. At the end of the school year, this information was compared with retainee data from district computer files.

The locally developed Potential Course Failure Record Sheet was designed to identify middle school pupils in danger of failing a mathematics course. Information concerning possible course failure was collected by program teachers from the pupils' subject area (mathematics) teacher and recorded on the instrument by December 1, 1989. At the end of the school year, this information was compared with course failure data from district computer files.

4. Parent Involvement Information

The Parent Involvement Survey was constructed locally to collect data on the nature and level of parent involvement in ESEA Chapter 1 programs. Program teachers reported data on a monthly basis, September 1989 through June 1990, and at the end of the school year. Monthly data included the number of program parents involved in five categories of parent involvement, the total number of hours that program parents were involved, and a monthly unduplicated count of the number of program parents involved. End-of-school-year data included an annual unduplicated count of the number of program parents involved, an estimate of the number of nonprogram parents involved in the five categories of parent involvement, and the total number of hours that nonprogram parents were involved. A copy of the Parent Involvement Survey can be found on pages 38-39 of Appendix A.

5. Inservice Evaluation Information

The locally-developed General Inservice Evaluation Form was designed to obtain the teacher's perceptions regarding the effectiveness of each inservice meeting and to provide feedback to program administrators. The form was distributed to participants at the close of inservice sessions held for Chapter 1 staff members. A modified version of the form, located on pages 40-41, Appendix A, was used for the Opening Conference for Chapter 1 teachers during September 1989. Dates and topics of the Chapter 1 inservice meetings for MIC teachers are shown in Table 2. Teachers completed the inservice evaluation forms for all of the inservice meetings. A copy of the General Inservice Evaluation Form can be found on page 42 of Appendix A.

Teachers jointly serving in a MIC-CAI (mathematics) program and a CLEAR-CAI (reading) program participated in other Chapter 1 inservice meetings pertaining to reading, computers, and related topics. Dates and topics of these sessions are not included in this report but are contained in the final evaluation report for the CLEAR Program (Lore & Chamberlain, 1990).

MIC-CBE teachers participated in other inservice activities that were informal planning meetings and/or work sessions conducted by the program coordinator. These meetings were not evaluated by the Department of Program Evaluation.

6. Computer Census Information

In addition to the five kinds of data specified in the evaluation design, information on computer usage was obtained for the MIC-CAI programs. The locally-constructed questionnaire, informally referred to as the Computer Census Form, served two purposes: to delineate and describe the various computer systems used in all CAI labs, and to determine the percent of

Table 2

Program Teacher Participation in MIC Inservice Meetings
by Date and Topic
1989-90

Date	Title of Inservice	Program		
		Elementary MIC-CAI	Elementary School MIC-CBE	Middle School MIC-CBE
August 31	Orientation for the 1989-90 School Year		X	X
September 1	Orientation for the 1989-90 School Year	X		
September 6	Patterns of Scheduling	X		
September 18	Orientation for the 1989-90 School Year (New Teachers)		X	X
September 28 (A.M.)	Using Manipulatives and Cooperative Learning	X	X	X
September 28 (P.M.)	Using the Instructional Management System		X	X
November 7-10	Using the Instructional Management System	X		
May 21	MIC Sharing and Evaluation		X	X
Total		4	5	5

program time that pupils worked at the computers in the different computer systems. Data collected from this instrument have been summarized in an interim evaluation report (Chamberlain, 1990). Portions of the data pertaining to the MIC-CAI programs are also included in this report. A copy of the Computer Census Form can be found on page 43 of Appendix A.

7. Process Evaluation Information

In addition to the types of data specified in the evaluation design a process evaluation was conducted, using a locally developed instrument, the Evaluator's Visitation Log. On-site visits to program schools were carried out. During the visitations classroom observations were conducted, teachers were interviewed, and questionnaire data were reviewed. A copy of the instrument is located in Appendix A, pages 44 to 51, and the results are summarized briefly in this report. The full interim report is on file at the Department of Program Evaluation and is available upon request.

Major Findings

MIC Computer Assisted Instruction Program (MIC-CAI)

Pupils were selected for the MIC-CAI programs on the basis of previous achievement test scores which indicated they were achieving at or below the 36th percentile in mathematics skills. Evaluation results are summarized as follows:

Pupil Census Information. During the 1989-90 school year the MIC-CAI programs served a total of 697 pupils in grades 3-5. Of the 697 pupils, 174 were in the third grade, 285 were in the fourth grade, and 238 were in the fifth grade.

Overall, the average number of hours of instruction per pupil per week was 3.1 hours. The average hours of instruction varied by grade level and ranged from 3.0 hours for grade 3, to 3.1 hours for grades 4 and 5. The average hours of instruction also varied from pupil to pupil. Among elementary pupils the average weekly instructional time ranged from 3.0 to 3.1 hours.

The average daily membership in the MIC-CAI program was 483.4 pupils. The average days of enrollment per pupil was 107.9 days, and the average attendance per pupil was 81.6 days. The average number of pupils served during the school year per teacher by the 22 half-time MIC-CAI teachers was 31.7, although the average number of pupils enrolled per teacher on any given day was 22.0 (average daily membership divided by 22 teachers). The attendance criterion was met by 601 pupils, or 86.2% of all program enrollees. Within grade levels the percentages of pupils served who met the attendance criterion ranged from 84.0% in grade 5 to 87.9% in grade 3. Data pertaining to enrollment and attendance are presented in Table 3.

Pupil census information also included the teacher's judgment of individual pupil progress as much, some, little, or no progress. Of the 697 pupils served in the program 136 (19.5%) were perceived by their program teachers as making much progress, 370 (53.1%) as making some progress, 169 (24.2%) as making little progress, and 22 (3.2%) as making no progress.

The evaluation samples were limited to those pupils who were English-speaking, had both the pretest and posttest administrations of the appropriate standardized achievement tests, and met the attendance criterion. To meet the attendance criterion, pupils must have been enrolled at least 30 days and attended the program at least 80% of their instructional period. Of the 697 pupils served, 1 (0.1%) was non-English speaking and therefore was excluded from the evaluation sample. Of the remaining 696 pupils, an additional 95 pupils were excluded due to nonattainment of the attendance criterion. Of the remaining 601 pupils, 79 lacked either a pretest or posttest in Total Mathematics, leaving an evaluation sample of 522 pupils for that particular test, and 84 lacked either a pretest or posttest in Mathematics Concepts and Applications, leaving an evaluation sample of 517 pupils for that particular test.

Standardized Achievement Test Information. Pretest-Posttest change score data for the MIC-CAI program are summarized in Tables 4-7. The normal curve equivalent (NCE), a standard score with a mean of 50 and a standard deviation of about 21, is used in Tables 4-7 because it provides the truest indication of pupil growth in achievement. The NCE is an equal unit of measurement, meaning that pretest and posttest change scores can be computed and averaged. It should be noted that NCEs, like percentile ranks, compare the pupils' performance in relation to the general population. No change in NCE score from pretest to posttest does not denote a lack of absolute progress; on the contrary, it means

Table 3

Number of Pupils Served; Averages for Days of Enrollment, Days of Attendance, Daily Membership, and Hours of Instruction Per Week; and Pupils Meeting Attendance Criterion for MIC-CAI Program Reported by Grade Level 1989-90

Grade	Pupils Served	Girls	Boys	Average				Pupils Meeting Attendance Criteria[c]
				Days of Enrollment[a]	Days of Attendance[b]	Daily Membership	Hours of Instruction per Pupil per Week	
3	174	99	75	108.0	81.4	121.9	3.0	153
4	285	145	140	109.3	82.5	198.1	3.1	248
5	238	131	107	106.2	80.8	163.3	3.1	200
Total	697	375	322	107.9	81.6	483.4	3.1	601

[a]Days of enrollment were counted from the day after the chapter test was given to qualify the pupil through the day of the chapter test indicating the pupil no longer needed treatment. Some MIC-CAI pupils may have had more than one enrollment period.

[b]Pupils normally received instruction an average of 3 class periods in a five-school-day cycle at the elementary level.

[c]Pupils must have been enrolled at least 30 days and must have attended the program at least 80% of their instructional days.

that over the school year the pupil has progressed at the expected rate of growth and has maintained the same relative position in terms of the general population. Even a small gain in NCEs indicates an advancement from the pupils' original position relative to the general population. For readers interested in percentile statistics see Tables B-1 and B-2 in Appendix B, pages 53 and 54.

Table 4 contains a summary of pretest, posttest and change scores for Total Mathematics for the 522 MIC-CAI pupils in grades 3-5. The data in Table 4 show the total average growth in Total Mathematics skills for all pupils was greater than expected. While the expected NCE change for the normal school population is zero NCE points during the course of a school year, the total average change for MIC-CAI pupils was 10.5 NCE points. The greatest average gain in NCE points was achieved at grade 3 with 17.2 NCE points, while grade 4 showed the smallest gain of 7.7 NCE points. Grade 5 showed a gain of 8.4 NCE points. All three grade levels exceeded the 3.0 NCE criterion specified in the desired outcomes. The average NCE score on the posttest was 39.7, whereas a score of 50.0 would be at grade level.

Table 5 contains data related to the changes in NCE scores for Total Mathematics for the three ranges: (a) no improvement in NCE scores (0.0 or less), (b) some improvement in NCE scores (0.1 to 2.9), and (c) substantial improvement in NCE scores (3.0 or more). The data indicate that 399 pupils (76.4%) made gains in NCE scores. This means that 76.4% of the pupils in the evaluation sample progressed at a rate that was greater than expected for them. More specifically, 369 pupils (70.7%) made substantial improvement; 28 pupils (5.7%) made some improvement; and 123 pupils (23.6%) made no improvement, as evidenced by a gain of 0.0 or a decline in NCE scores.

Table 6 contains a summary of pretest, posttest and change scores for Mathematics Concepts and Applications for the 517 MIC-CAI pupils in grades 3-5. The data in Table 6 show the total average growth in Mathematics Concepts and Applications skills for all pupils was greater than expected. While the expected NCE change for the normal school population is zero NCE points during the course of a school year, the total average change for MIC-CAI pupils was 5.7 NCE points. The greatest average gain in NCE points was achieved at grade 3 with 14.3 NCE points, while grade 5 showed the smallest gain of 1.3 NCE points. Grade 4 showed a gain of 3.3 NCE points. Two of three grade levels exceeded the 3.0 NCE criterion specified in the desired outcomes. The average NCE score on the posttest was 38.3, whereas a score of 50.0 would be at grade level.

Table 7 contains data related to the changes in NCE scores for Mathematics Concepts and Applications for the three ranges: (a) no improvement in NCE scores (0.0 or less), (b) some improvement in NCE scores (0.1 to 2.9), and (c) substantial improvement in NCE scores (3.0 or more). The data indicate that 335 pupils (64.8%) made gains in NCE scores. This means that 64.8% of the pupils in the evaluation sample progressed at a rate that was greater than expected for them. More specifically, 307 pupils (59.4%) made substantial improvement; 28 pupils (5.4%) made some improvement; and 182 pupils (35.2%) made no improvement, as evidenced by a gain of 0.0 or a decline in NCE scores.

Table 4

Minimum, Maximum, Average, and Standard Deviation of the Pretest and Posttest Normal Curve Equivalents (NCE) for MIC-CAI Program in Total Mathematics Reported by Grade Level 1989-90

Grade	Number of Pupils	Pretest				Posttest				Average NCE Change
		Min.	Max.	Average NCE	Standard Deviation	Min.	Max.	Average NCE	Standard Deviation	
3	140	1.0	67.0	27.0	14.4	1.0	88.0	44.2	16.8	17.2
4	220	1.0	73.0	28.6	10.7	1.0	82.0	36.2	13.3	7.7
5	162	1.0	58.0	32.2	9.2	6.0	82.0	40.6	13.4	8.4
Total	522			29.3	11.6			39.7	14.7	10.5

Table 5

Number and Percent of Pupils in Change Categories for NCE Scores for MIC-CAI Program in Total Mathematics Reported by Grade Level 1989-90

	Change Categories for NCE Scores			
	No Improvement (0.0 or less)	Some Improvement (0.1 to 2.9)	Substantial Improvement (3.0 or more)	Total Pupils in Sample
Grade 3				
Number of Pupils	20	4	116	140
% of Pupils	14.3%	2.9%	82.9%	26.8%
Grade 4				
Number of Pupils	63	17	140	220
% of Pupils	28.6%	7.7%	63.6%	42.1%
Grade 5				
Number of Pupils	40	9	113	162
% of Pupils	24.7%	5.6%	69.8%	31.0%
Total Group				
Number of Pupils	123	30	369	522
% of Pupils	23.6%	5.7%	70.7%	100.0%

Table 6

Minimum, Maximum, Average, and Standard Deviation of the Pretest and Posttest Normal Curve Equivalents (NCE) for MIC-CAI Program in Mathematics Concepts and Applications Reported by Grade Level 1989-90

Grade	Number of Pupils	Pretest				Posttest				Average NCE Change
		Min.	Max.	Average NCE	Standard Deviation	Min.	Max.	Average NCE	Standard Deviation	
3	139	1.0	64.0	27.2	13.4	1.0	88.0	41.5	13.8	14.3
4	220	1.0	76.0	33.7	10.9	2.0	77.0	37.0	13.2	3.3
5	158	1.0	72.0	36.1	11.0	7.0	76.0	37.4	12.9	1.3
Total	517			32.7	12.1			38.3	13.4	5.7

Table 7

Number and Percent of Pupils in Change Categories for
NCE Scores for MIC-CAI Program in Mathematics Concepts and Applications
Reported by Grade Level
1989-90

	Change Categories for NCE Scores			
	No Improvement (0.0 or less)	Some Improvement (0.1 to 2.9)	Substantial Improvement (3.0 or more)	Total Pupils in Sample
Grade 3				
Number of Pupils	21	4	114	139
% of Pupils	15.1%	2.9%	82.0%	26.9%
Grade 4				
Number of Pupils	85	14	121	220
% of Pupils	38.6%	6.4%	55.0%	42.6%
Grade 5				
Number of Pupils	76	10	72	158
% of Pupils	48.1%	6.3%	45.6%	30.6%
Total Group				
Number of Pupils	182	28	307	517
% of Pupils	35.2%	5.4%	59.4%	100.0%

Potential Retainee Information. Program teachers collected information from pupils' regular classroom teachers about possible retention by December 1, 1989. Using a locally developed instrument, the Potential Retainee Record Sheet, program pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period were identified by their teachers as being in danger of being retained early in the school year. These data were then compared with actual student records at the end of the school year. The data for the MIC-CAI program are summarized in Table 8. The data summarized in Table 8 indicate that teachers identified 82 (14.6%) of the 560 program pupils as being potential retainees early in the school year. However, of the 82 students so identified, only 13 (15.9%) actually were retained in grade. In other words, 69 (84.1%) of the 82 pupils identified were not retained in grade, far exceeding the criterion of 35% specified in the desired outcomes.

Table 9

Number of Potential and Actual Pupil Retainees in the MIC-CAI Program

Total Number of Pupils	Number of Pupils Identified as Potential Retainees	Number of Pupils Actually Retained
560	82	13

Parent Involvement Information. The Parent Involvement Form provided information from teachers at the end of each month (September 1989 through June 1990) concerning program activities involving parents who had children in the program. These data are presented by month in Table 9. Because teachers served pupils in both the MIC-CAI and the CLEAR-CAI programs, parent involvement data had to be prorated between the two programs. The data were prorated based on the number of full-time equivalent (FTE) teachers in each program. This accounts for the statistical oddity of the fractional parents encountered in Table 9. The months showing the most and least parent involvement were October, with a total of 289.9 contacts in 165.4 parent hours, and June, with a total of 41.3 contacts in 35.6 parent hours.

Individual parent conferences accounted for more parent contacts (722.9) than any other activity. Yearly totals for the other activities were: group meetings with parents, 336.7 contacts in 432.4 parent hours; parent classroom visits or field trips, 155.2 contacts in 91.1 parent hours; planning, operation, and/or evaluation, 68.3 contacts in 56.4 parent hours; and visits by the teacher to parents' homes, 28.3 contacts in 24.7 parent hours. The yearly totals for all five types of parent activity were 1311.4 parent contacts in 881.0 parent hours. Because a parent could have involvement in more than one contact, a yearly unduplicated count was also obtained from program teachers in June. This count indicated a total of 435 different parents of program pupils had one or more contacts with the program during the school year.

Inservice Evaluation Information. The General Inservice Evaluation Form was completed by the MIC-CAI teachers for the four inservice meetings which occurred from September 1989 through November 1989. The number of inservice meetings was greater than the minimum of two meetings that was specified in the program guidelines. Participants were asked after each session to rate four statements

Table 9

Number of Parents Involved and Total Parent Hours
for MIC-CAI Programs Reported by Month
1989-90

Program Activities	Months										Totals for Year
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	
1. Parents involved in the planning, operation and/or evaluation of your unit											
Number of Parents	16.5	15.3	6.3	10.6	3.1	3.5	3.5	2.4	3.9	3.1	68.3
Total Parent Hours	12.6	17.9	6.9	3.5	2.4	3.1	1.8	2.0	2.9	3.3	56.4
2. Group meetings for parents											
Number of Parents	79.8	86.4	13.0	14.1	12.2	50.7	43.6	11.8	20.0	5.1	336.7
Total Parent Hours	97.2	91.3	7.5	22.8	14.7	88.6	45.6	15.7	40.6	8.4	432.4
3. Individual parent conferences											
Number of Parents	79.0	141.4	151.6	27.9	47.9	103.3	76.6	36.5	39.3	19.3	722.9
Total Parent Hours	19.1	36.7	80.9	12.0	18.1	44.2	25.7	17.5	13.9	8.3	276.4
4. Parental classroom visits or field trips											
Number of Parents	9.4	44.0	10.6	9.8	12.6	18.5	18.1	8.3	12.2	11.8	155.2
Total Parent Hours	3.3	17.1	7.3	6.5	7.7	9.4	13.6	5.1	7.2	13.9	91.1
5. Visits by teacher to parents' homes											
Number of Parents	1.6	2.8	0.8	0.8	3.1	5.9	4.7	5.1	1.6	2.0	28.3
Total Parent Hours	2.0	2.4	0.8	1.4	4.1	2.9	4.3	3.7	1.4	1.7	24.7
Total Parent Contacts	186.2	289.9	182.3	63.3	79.0	181.9	146.5	64.0	77.0	41.3	1311.4
Total Parent Hours	134.2	165.4	103.4	46.2	47.0	148.2	91.0	44.0	66.0	35.6	881.0

Note. Data were prorated between the MIC-CAI and CLEAR-CAI Programs based on program teacher full-time equivalence (FTE).

about the inservice using a 5-point scale which ranged from Strongly Agree (5) to Strongly Disagree (1). A copy of the General Inservice Evaluation Form is located on page 42 of Appendix A.

Workshop participants generally gave the Chapter 1 inservice meetings high ratings. The average ratings for the four inservice statements ranged from 4.6 to 4.7 on the 5-point scale. Overall ratings by participants are summarized in Table 10.

Open-ended questions on the General Inservice Evaluation Form asked participants to comment about the most and least valuable parts of the meetings, and about additional information or topics they would like to have covered in future meetings. Generally, participants made favorable comments on the inservice topics, indicating that they enjoyed hands-on computer experience, sharing ideas with other program teachers, and learning how to use various manipulatives in Mathematics labs. These comments were summarized in the evaluation reports on individual sessions that were submitted to the Department of Federal and State Programs and are available on request.

Table 10

Number Responding, Average Response, and Percent of Response For Reactions to Inservice Statements for MIC-CAI Programs 1989-90

Statements	Number Responding	Average Response	Percent SA (5)	A (4)	U (3)	D (2)	SD (1)
1. I think this was a very worthwhile meeting.	91	4.7	74.7	23.1	2.2	0.0	0.0
2. The information presented in this meeting will assist me in my program.	91	4.7	72.5	26.4	1.1	0.0	0.0
3. There was time to ask questions pertaining to the presentation.	91	4.6	63.7	30.8	2.2	2.2	1.1
4. Questions were answered adequately.	88	4.6	62.5	34.1	3.4	0.0	0.0

Note. Ratings based on 5-point scale where SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, and SD=Strongly Disagree.

Computer Census Information. To supplement the data collection specified in the evaluation design, information was obtained from all teachers in the MIC-CAI programs by means of a Computer Census Form (Chamberlain, 1990). This questionnaire was mailed in February and was completed by all MIC-CAI teachers by March 1990. Results of the Computer Census Form are presented in Table 11.

Of the 22 elementary school labs, 19 had Apple microcomputers that were serviced by the Jostin Company. Jostin Company elementary labs were each equipped with 6 Apple microcomputers, one of which was used for the teacher's in-lab management system and for hands-on testing. Additional teaching machines were also used in these labs.

One elementary school lab had the Sperry Network System and was serviced by Wasatch. This lab networked 4 Sperry microcomputers and 1 AT&T microcomputer as student stations, plus a 5th Sperry microcomputer which was limited to teacher use as a command module.

Table 11

Number of Labs, Average Pupil Time at the Computer and in the Program, and Percent Computer Time by Type of Lab for MIC-CAI Programs 1989-90

Type of Lab	Number of Labs	Average Minutes Per Week At Computer	Average Minutes Per Week In Program	Percent Computer Time
Elementary				
Jostin (Apple)	19	77.1	182.4	42.3
Wasatch (Sperry)	1	180.0	200.0	90.0
CCC Microhost Lab	2	100.0	200.0	50.0
Total	22	83.8	184.8	45.4

Note. Adapted from Chamberlain, 1990.

The remaining 2 elementary school labs (in one school) were serviced by the Computer Curriculum Corporation (CCC). A central CCC microhost was hooked up to the individual microcomputers in the 2 labs. Each lab had a total of 8 microcomputers for pupil use: 4 Apple and 4 Atari. In addition, each lab had a 5th Atari which was used as a teacher management system.

All of the elementary school labs that were used for MIC-CAI instruction were also used for CLEAR-CAI instruction, however, several labs were used only for CLEAR-CAI instruction. Some of the computer systems that were in the elementary school CLEAR-CAI labs were not found in the labs used for both MIC-CAI and CLEAR-CAI pupils (Chamberlain, 1990). Specifically, the Integrated Language Arts (ILA) system, serviced by the Jostin Company; the Tandy TRS-80 color microcomputers, serviced by the B&B Company; and the Tandy 1000-SL microcomputers and Tandy 4000, serviced by Wasatch, were used for CLEAR-CAI but not MIC-CAI instruction.

Overall, MIC-CAI pupils received 45.4% of their instruction at the computer stations. It is notable, however, that the average percent of pupil computer time was considerably greater (90.0%) for the Sperry labs. Results from observations and interviews conducted in previous years (Chamberlain, 1989) suggest that a variety of teacher-directed individual and group activities would account for the remaining program time.

Process Evaluation Information. On-site visitations and teacher interviews were conducted by the program evaluator in March 1990 in 11 of 22 MIC-Elementary-CAI labs. The instrument used, Evaluator's Visitation Log, located on pages 44 to 51, in Appendix A, consisted of three parts: (1) a questionnaire consisting of 32 items grouped into 9 areas, with each item rated on a five-point scale, (2) a 16 item checklist of observed instructional activities, and (3) eight additional interview questions. For ease in interpretation, average ratings from the questionnaire were dichotomized as high (average ratings of 4.0 or higher) or in the mid-range or lower (average ratings of less than 4.0).

The MIC-Elementary-CAI teachers gave the majority of rating scale items high ratings (average ratings of 4.0 or higher). In fact, only two of nine areas, Parent Involvement and Testing received consistently lower or mid-range ratings (average ratings of less than 4.0). Teacher ratings indicated that efforts to involve parents in school activities met with only moderate response (3.3), and that pupil behavior showed some improvement due to parent involvement (3.7). Also, teachers felt that the choice of achievement test was above average, some problems were encountered in administering the test, scheduling the test administration was difficult and the time required to administer the test was reasonable.

The remaining seven areas received mostly higher ratings. In the areas of Pupil Progress teachers were generally satisfied with overall pupil progress (3.9), and shared pupil progress with the classroom teacher (4.1). In the area of Coordination with Classroom Teacher, teachers indicated that classroom teachers were cooperative (4.4), and coordination with the classroom teacher was effective (4.4). Joint planning with the classroom teacher was infrequent (2.3), however. The following areas received, consistently high teacher ratings: Selection Process (4.0 for all items), Class Scheduling (4.3 to 4.5), Evaluation Feedback (4.3 to 4.5), and Materials Provided for Program (4.1 to 4.6). The area of Facilities received high ratings on all items (4.3 to 4.7), except Temperature/Ventilation, which received a slightly lower rating (3.8).

In addition to the rating scale items, the process instrument addressed the variety of instructional activities that were used by MIC-Elementary-CAI teachers. The most frequently observed instructional activities observed were: Doing Computer Activities (81.8%), Working on Drill and Practice (81.8%), Reviewing and Strengthening Specific Skills (63.6%) and Working Problems at the Chalk Board (54.5%).

Finally, teachers were asked several questions after the classroom observations, most of which concerned various record-keeping procedures. Of note, however, were the three items which concerned coordination with the classroom teachers, contact with the home, and monitoring pupil progress. In response to these questions, teachers indicated that informal contact was the primary method used for coordination with classroom teachers (90.9%); the Progress Reports (e.g. checklists, computer generated reports, etc.) were the primary method used to report to parents (90.9%); and the Computer Management System was the primary method of monitoring pupil progress (100.0%).

Teachers also had the opportunity to comment on various facets of the program. Primary areas of concern included not being able to administer the districtwide test in small group settings, and difficulties in scheduling for some pupils due to other programs such as PEAK. Teachers noted that they were very pleased with the Instructional Management System, a computer program for organizing pupil data and producing reports on pupil progress.

MIC Competency Based Education Program (MIC-CBE)

Pupils were selected for the MIC-CBE program on the basis of previous achievement test scores which indicated they were achieving at or below the 36th percentile in mathematics skills. Evaluation results are summarized as follows:

Pupil Census Information. During the 1989-90 school year the MIC-CBE program served a total of 1,353 pupils in grades 3-8. Of the 1,353 pupils, 522 were in the elementary schools (grades 3-5), and 831 were in the middle schools (grades 6-8).

Overall, the average number of hours of instruction per pupil per week was 1.7 hours. The average hours of instruction varied by grade level and ranged from 1.4 hours for grades 6-8, to 2.2 hours for grade 4. The average hours of instruction also varied from pupil to pupil. Among elementary pupils the average weekly instructional time ranged from 2.1 to 2.2 hours.

The average daily membership in the MIC-CBE program was 520.1 pupils. The average days of enrollment per pupil was 100.5 days, and the average attendance per pupil was 38.5 days. The average number of pupils served during the school year per teacher by the 22 MIC-CBE teachers was 61.5, although the average number of pupils enrolled per teacher on any given day was 23.6 (average daily membership divided by 22 teachers). The attendance criterion was met by 712 pupils, or 52.6% of all program enrollees. Within grade levels the percentages of pupils served who met the attendance criterion ranged from 44.7% in grade 7 to 67.7% in grade 8. Data pertaining to enrollment and attendance are presented in Table 12.

Pupil census information also included the teacher's judgement of individual pupil progress as much, some, little, or no progress. Of the 1353 pupils served in the program 358 (26.5%) were perceived by their program teachers as making much progress, 528 (39.0%) as making some progress, 360 (26.6%) as making little progress, and 107 (7.9%) as making no progress.

The evaluation samples were limited to those pupils who were English-speaking, had both the pretest and posttest administrations of the appropriate standardized achievement tests, and met the attendance criterion. To meet the attendance criterion, pupils must have been enrolled at least 30 days and attended the program at least 80% of their instructional period. Of the 1353 pupils served, 2 were non-English speaking and therefore were excluded from the evaluation sample. Of the remaining 1351 pupils, an additional 640 pupils were excluded due to nonattainment of the attendance criterion. Of the remaining 711 pupils, 126 lacked either a pretest or posttest in Total Mathematics, leaving an evaluation sample of 585 pupils for that particular test, and 127 lacked either a pretest or posttest in Mathematics Concepts and Applications, leaving an evaluation sample of 584 pupils for that particular test.

Standardized Achievement Test Information. Pretest-Posttest change score data for the MIC-CBE program are summarized in Tables 13-16. As mentioned previously, the normal curve equivalent (NCE) is used in Tables 13-16 because it provides the truest indication of pupil growth in achievement. Again it should

Table 12

Number of Pupils Served; Averages for Days of Enrollment, Days of Attendance, Daily Membership, and Hours of Instruction Per Week; and Pupils Meeting Enrollment and Attendance Criteria for MIC-CBE Program Reported by Grade Level 1989-90

Grade	Pupils Served	Girls	Boys	Average Days of Enrollment[a]	Average Days of Attendance[b]	Average Daily Membership	Average Hours of Instruction per Pupil per Week	Pupils Meeting Enrollment and Attendance Criteria[c]
3	149	82	67	99.6	52.9	73.4	2.1	96
4	189	97	92	99.0	52.9	94.1	2.2	121
5	184	99	85	96.8	49.2	88.0	2.1	109
6	462	229	233	104.5	31.3	151.1	1.4	214
7	338	163	175	98.5	28.7	103.7	1.4	151
8	31	18	13	99.5	33.8	9.8	1.4	21
Total	1353	688	665	100.5	38.5	520.1	1.7	712

[a]Days of enrollment were counted from the day after the chapter test was given to qualify the pupil through the day of the chapter test indicating the pupil no longer needed treatment. Some MIC-CBE pupils may have had more than one enrollment period.

[b]Pupils normally received instruction an average of 3 class periods in a five-school-day cycle at the elementary level while pupils in middle schools received instruction an average of 2 class periods in a five-school-day cycle.

[c]Pupils must have been enrolled at least 30 days and must have attended the program at least 80% of their instructional days.

Table 13

Minimum, Maximum, Average, and Standard Deviation of the Pretest and Posttest Normal Curve Equivalents (NCE) for MIC-CBE Program in Total Mathematics Reported by Grade Level
1989-90

Grade	Number of Pupils	Pretest				Posttest				Average NCE Change
		Min.	Max.	Average NCE	Standard Deviation	Min.	Max.	Average NCE	Standard Deviation	
3	81	1.0	59.0	27.9	14.1	7.0	80.0	48.1	13.9	20.3
4	101	1.0	59.0	28.3	11.8	6.0	76.0	39.0	11.8	10.6
5	85	6.0	69.0	34.4	9.9	1.0	79.0	42.7	16.9	8.3
6	170	1.0	65.0	31.0	9.7	1.0	73.0	39.5	15.0	8.5
7	130	1.0	47.0	28.9	8.2	1.0	92.0	40.6	13.0	11.7
8	18	27.0	39.0	33.3	4.1	31.0	45.0	37.2	4.0	3.9
Total	585			30.2	10.6			41.3	14.2	11.0

Table 14

Number and Percent of Pupils in Change Categories for NCE Scores for MIC-CBE Program in Total Mathematics Reported by Grade Level 1989-90

	Change Categories for NCE Scores			
	No Improvement (0.0 or less)	Some Improvement (0.1 to 2.9)	Substantial Improvement (3.0 or more)	Total Pupils in Sample
Grade 3				
Number of Pupils	7	3	71	81
% of Pupils	8.6%	3.7%	87.7%	13.8%
Grade 4				
Number of Pupils	16	5	80	101
% of Pupils	15.8%	5.0%	79.2%	17.3%
Grade 5				
Number of Pupils	23	3	60	85
% of Pupils	25.9%	3.5%	70.6%	14.5%
Grade 6				
Number of Pupils	51	10	109	170
% of Pupils	30.0%	5.9%	64.1%	29.1%
Grade 7				
Number of Pupils	28	4	98	130
% of Pupils	21.5%	3.1%	75.4%	22.2%
Grade 8				
Number of Pupils	3	5	10	18
% of Pupils	16.7%	27.8%	55.6%	3.1%
Total Group				
Number of Pupils	127	30	428	585
% of Pupils	21.7%	5.1%	73.2%	100.0%

Table 15

Minimum, Maximum, Average, and Standard Deviation of the Pretest and Posttest Normal Curve Equivalents (NCE) for MIC-CBE Program in Mathematics Concepts and Applications Reported by Grade Level 1989-90

Grade	Number of Pupils	Pretest				Posttest				Average NCE Change
		Min.	Max.	Average NCE	Standard Deviation	Min.	Max.	Average NCE	Standard Deviation	
3	82	1.0	99.0	29.8	13.8	1.0	81.0	46.0	13.9	16.2
4	103	1.0	60.0	33.7	11.5	2.0	77.0	38.1	11.9	4.4
5	81	21.0	72.0	39.0	7.9	7.0	80.0	39.9	15.8	0.9
6	170	7.0	66.0	31.6	11.0	3.0	68.0	36.6	13.2	5.0
7	130	1.0	54.0	29.2	9.4	1.0	90.0	41.5	14.1	12.2
8	18	20.0	45.0	32.0	7.0	21.0	50.0	34.4	7.3	2.4
Total	584			32.2	11.1			39.7	13.9	7.4

Table 16

Number and Percent of Pupils in Change Categories for
NCE Scores for MIC-CBE Program in Mathematics Concepts and Applications
Reported by Grade Level
1989-90

	Change Categories for NCE Scores			Total Pupils in Sample
	No Improvement (0.0 or less)	Some Improvement (0.1 to 2.9)	Substantial Improvement (3.0 or more)	
Grade 3				
Number of Pupils	7	3	72	82
% of Pupils	8.5%	3.7%	87.8%	14.0%
Grade 4				
Number of Pupils	35	10	58	103
% of Pupils	34.0%	9.7%	56.3%	17.6%
Grade 5				
Number of Pupils	35	6	40	81
% of Pupils	43.2%	7.4%	49.4%	13.9%
Grade 6				
Number of Pupils	66	9	95	170
% of Pupils	38.8%	5.3%	55.9%	29.1%
Grade 7				
Number of Pupils	27	5	98	130
% of Pupils	20.8%	3.8%	75.4%	22.3%
Grade 8				
Number of Pupils	8	2	8	18
% of Pupils	44.4%	11.1%	44.4%	3.1%
Total Group				
Number of Pupils	178	35	371	584
% of Pupils	30.5%	6.0%	63.5%	100.0%

be noted that NCEs like percentile ranks, compare the pupils' performance in relation to the general population. No change in NCE score from pretest to posttest does not denote a lack of absolute progress; on the contrary, it means that over the school year the pupil has progressed at the expected rate of growth and has maintained the same relative position in terms of the general population. Therefore even a small gain in NCEs indicates an advancement from the pupils' original position relative to the general population. For readers interested in percentile statistics, see Tables B-3 and B-4 in Appexdix B, pages 55 and 56.

Table 13 contains a summary of pretest, posttest and change scores for Total Mathematics for the 585 MIC-CBE pupils in grades 3-8. The data in Table 13 show the total average growth in Total Mathematics skills for all pupils was greater than expected. While the expected NCE change for the normal school population is zero NCE points during the course of a school year, the total average change for MIC-CBE pupils was 11.0 NCE points. The greatest average gain in NCE points was achieved at grade 3 with 20.3 NCE points, while grade 8 showed the smallest gain of 3.9 NCE points. All grade levels exceeded the 3.0 NCE criterion specified in the desired outcomes. The average NCE score on the posttest was 41.3 whereas a score of 50.0 would be at grade level.

Table 14 contains data related to the changes in NCE scores for Total Mathematics for the three ranges: (a) no improvement in NCE scores (0.0 or less), (b) some improvement in NCE scores (0.1 to 2.9), and (c) substantial improvement in NCE scores (3.0 or more). The data indicate that 458 pupils (78.3%) made gains in NCE scores. This means that 78.3% of the pupils in the evaluation sample progressed at a rate that was greater than expected for them. More specifically, 428 pupils (73.2%) made substantial improvement; 30 pupils (5.1%) made some improvement; and 127 pupils (21.7%) made no improvement, as evidenced by a gain of 0.0 or a decline in NCE scores.

Table 15 contains a summary of pretest, posttest and change scores for Mathematics Concepts and Applications for the 584 MIC-CBE pupils in grades 3-8. The data in Table 15 show the total average growth in Mathematics Concepts and Applications skills for all pupils was greater than expected. While the expected NCE change for the normal school population is zero NCE points during the course of a school year, the total average change for MIC-CBE pupils was 7.4 NCE points. The greatest average gain in NCE points was achieved at grade 3 with 16.2 NCE points, while grade 5 showed the smallest gain of 0.9 NCE points. This small gain at grade 5 was less than the 3.0 NCE criterion specified in the desired outcomes. Grade 8 also fell below the specified criterion with an NCE gain of only 2.4. The remaining grade levels exceeded the 3.0 NCE criterion specified in the desired outcomes. The average NCE score on the posttest was 39.7 whereas a score of 50.0 would be at grade level.

Table 16 contains data related to the changes in NCE scores for Mathematics Concepts and Applications for the three ranges: (a) no improvement in NCE scores (0.0 or less), (b) some improvement in NCE scores (0.1 to 2.9), and (c) substantial improvement in NCE scores (3.0 or more). The data indicate that 406 pupils (69.5%) made gains in NCE scores. This means that 69.5% of the pupils in the evaluation sample progressed at a rate that was greater than expected for them. More specifically, 371 pupils (63.5%) made substantial improvement; 35 pupils (6.0%) made some improvement; and 178 pupils (30.5%) made no improvement, as evidenced by a gain of 0.0 or a decline in NCE scores.

Potential Retainee/Course Failure Information. Program teachers collected information from pupils' regular classroom or subject area teachers about possible retention/course failure by December 1, 1989. Using locally developed

instruments, the Potential Retainee Record Sheet at the elementary level and the Potential Course Failure Record Sheet at the middle level, program pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period were identified by their teachers as being in danger of being retained or failed early in the school year. These data were then compared with actual student records at the end of the school year.

The results for the MIC-CBE program are summarized in Table 17. The data summarized in Table 17 indicate that of the 638 program pupils, teachers identified a total of 189, or 29.6%, as being potential retainees or course failures early in the school year. Of the 189 pupils so identified, 139 (73.5%) were at the middle school level. The number of pupils actually retained/failed was 59 (31.2%) of the 189 pupils identified as possible retainees/failures. In other words, 130 (68.8%) of the 189 pupils identified were not retained/failed, far exceeding the criterion of 35% specified in the desired outcomes.

It should be noted that of the 59 actual retainees/course failures, 50 (84.7%) were at the middle school level. In other words, at the elementary level, 9 (18.0%) of 50 pupils identified as potential retainees actually were retained. At the middle school level, 50 (36.0%) of 139 pupils identified as potential course failures actually failed their mathematics course.

Table 17

Number of Potential and Actual Pupil Retainees/Course Failures by Grade-Level in the MIC-CBE Program

Grade Level	Total Number of Pupils	Number of Pupils Identified as Potential Retainees	Number of Pupils Actually Retained
Elementary	294	50	9
Middle	344	139	50
Total	638	189	59

Parent Involvement Information. The Parent Involvement Form provided information from teachers at the end of each month (September 1989 through June 1990) concerning program activities involving parents who had children in the program. Results are presented by month in Table 18. The months showing the most and least parent involvement were October, with a total of 382.0 contacts in 285.5 parent hours, and June, with a total of 42.0 contacts in 64.0 parent hours. Individual parent conferences accounted for more parent contacts (1066.0) than any other activity. Yearly totals for the other activities were: group meetings with parents, 303.0 contacts in 323.0 parent hours; parent classroom visits or field trips, 189.0 contacts in 141.5 parent hours; planning, operation, and/or evaluation, 86.0 contacts in 59.0 parent hours; and visits by the teacher to parents' homes, 7.0 contacts in 5.0 parent hours. The yearly totals for all five types of parent activity were 1651.0 parent contacts in 940.5 parent hours. Because a parent could have involvement in more than one contact, a yearly unduplicated count was also obtained from program teachers in June. This count indicated a total of 739 different parents of program pupils had one or more contacts with the program during the school year.

Table 18

Number of Parents Involved and Total Parent Hours
for MIC-CBE Program Reported by Month
1989-90

Program Activities	Months										Totals for Year
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	
1. Parents involved in the planning, operation and/ or evaluation of your unit											
Number of Parents	4.0	18.0	11.0	16.0	5.0	8.0	6.0	4.0	9.0	5.0	86.0
Total Parent Hours	7.0	12.5	6.5	4.5	4.5	5.0	6.0	3.5	5.5	4.0	59.0
2. Group meetings for parents											
Number of Parents	18.0	142.0	23.0	22.0	11.0	13.0	64.0	0.0	9.0	1.0	303.0
Total Parent Hours	27.0	169.0	9.0	7.0	14.0	16.5	74.0	0.0	5.5	1.0	323.0
3. Individual parent conferences											
Number of Parents	48.0	139.0	179.0	76.0	90.0	241.0	122.0	78.0	69.0	24.0	1066.0
Total Parent Hours	16.0	75.0	70.5	26.0	33.0	88.0	45.5	25.0	25.0	8.0	412.0
4. Parental classroom visits or field trips											
Number of Parents	11.0	83.0	9.0	11.0	11.0	27.0	8.0	4.0	13.0	12.0	189.0
Total Parent Hours	5.0	29.0	4.5	15.0	6.5	9.0	4.0	3.5	14.0	51.0	141.5
5. Visits by teacher to parents' homes											
Number of Parents	1.0	0.0	0.0	1.0	1.0	2.0	1.0	1.0	0.0	0.0	7.0
Total Parent Hours	0.5	0.0	0.0	1.5	1.0	1.0	0.5	0.5	0.0	0.0	5.0
Total Parent Contacts	82.0	382.0	222.0	126.0	118.0	291.0	201.0	87.0	100.0	42.0	1651.0
Total Parent Hours	55.5	285.5	90.5	54.0	59.0	119.5	130.0	32.5	50.0	64.0	940.5

Inservice Evaluation Information. The General Inservice Evaluation Form, located on page 42 of Appendix A, was completed by MIC-CBE teachers for the five inservice meetings which occurred from August 1989 through May 1990. The number of inservice meetings was greater than the minimum of two meetings during the school year that was specified in the program guidelines. All five of the meetings were attended by both elementary and middle school MIC-CBE teachers (see Table 2, p.6). Participants were asked after each session to rate four statements about the inservice using a 5-point scale which ranged from Strongly Agree (5) to Strongly Disagree (1).

Workshop participants generally gave the Chapter 1 inservice meetings high ratings. The average ratings for the four inservice statements ranged from 4.6 to 4.8 on the 5-point scale. Overall ratings by participants are summarized in Table 19.

Table 19

Number Responding, Average Response, and Percent of Response For Reactions to Inservice Statements for MIC-CBE Program 1989-90

Statement	Number Responding	Average Response	Percent SA (5)	A (4)	U (3)	D (2)	SD (1)
1. I think this was a very worthwhile meeting.	83	4.8	85.5	12.1	2.4	0.0	0.0
2. The information presented in this meeting will assist me in my program.	83	4.8	83.1	15.7	1.2	0.0	0.0
3. There was time to ask questions pertaining to the presentation.	80	4.7	78.8	12.5	5.0	3.7	0.0
4. Questions were answered adequately.	82	4.6	70.7	19.5	4.9	4.9	0.0

Note. Ratings based on 5-point scale where SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, and SD=Strongly Disagree.

Open-ended questions on the General Inservice Evaluation Form asked participants to comment about the most and least valuable parts of the meetings, and about additional information or topics they would like to have covered in future meetings. Specific comments were summarized in the evaluation reports on inservice meetings that were forwarded to the Department of Federal and State Programs and are available on request. Many teachers commented favorably on the use of the Computer Management System in streamlining their record keeping duties, and they desired more inservice meetings on the same subject.

Process Evaluation Information. On-site visitations and teacher interviews were conducted by the program evaluator in March 1990 in eight of 10 MIC-Elementary-CBE labs and all 12 MIC-Middle-CBE labs. The instrument used, Evaluator's Visitation Log, consisted of three parts: (1) a questionnaire consisting of 32 items grouped into 9 areas, with each item rated on a five-point scale, (2) a 16 item checklist of observed instructional activities, and (3) eight additional interview questions. For ease in interpretation, average ratings from the questionnaire were dichotomized as high (average ratings of 4.0 or higher) or in the mid-range or lower (average ratings of less than 4.0).

The MIC-CBE teachers gave the majority of rating scale items high ratings (average ratings of 4.0 or higher), although many items received mid-range ratings (average ratings of 3.0 to 3.9). One area that received consistently lower ratings was Parent Involvement. Teacher ratings indicated that efforts to involve parents in school activities met with little success at either the elementary (2.8) or the middle school level (2.0). Teachers indicated that pupil behavior showed some improvement due to parent involvement at both levels (2.9 to 3.0), and progress reports to parents were infrequent (2.4 to 2.5).

The remaining eight areas received mostly higher ratings. In the area of Pupil Progress teachers were generally satisfied with overall pupil progress, with the elementary teachers (4.1) a little more satisfied than middle school teachers (3.6). Pupil Progress was shared with the classroom teacher (4.3 to 4.6). In the area of Coordination with Classroom Teacher, teachers indicated that classroom teachers were cooperative (4.5 to 4.8), and coordination with the classroom teacher was effective (4.4). Joint planning with the classroom teacher was not frequent (3.1 to 3.3), however. In the area of Selection Process, teachers assigned slightly lower ratings to the test choice (3.5 to 3.9) and problems with test (3.6 to 3.9) items, than to the items on procedures (4.3 to 4.4) and time required (3.4 to 4.0). Similarly, in the area of Testing (CTBS), teachers assigned slightly lower ratings to the choice of test (3.7 to 3.8), problems with the test (3.7), and scheduling the test (3.8 to 3.9), than to testing procedures (4.1 to 4.3) and time required (3.9 to 4.0). In the area of Evaluation Feedback the teachers indicated that the quantity of information was satisfactory (4.3) as well as useful (4.1 to 4.5) but gave slightly lower ratings to the timeliness of such information (3.9). The area of Facilities varied in ratings for different items. The highest rated item in this area was lighting (4.3) while the lowest rated item was temperature/ventilation (3.1 to 3.4). Ratings on the item on storage indicated that elementary teachers (4.0) apparently had more storage area than middle school teachers (3.0). The two remaining areas, Class Scheduling (4.3 to 4.9) and Materials Provided for Program (4.3 to 4.4) were consistently rated high by all program teachers, elementary and middle.

In addition to rating scale items, the process instrument addressed the variety of instructional activities that were used by MIC-CBE teachers. The most frequently observed instructional activity in elementary classrooms was Doing Computer Activities (100.0%), while in middle school classrooms Reviewing and Strengthening Specific Skills (75.0%) was the most frequently observed instructional activity.

Finally, teachers were asked several questions after the classroom observations, most of which concerned various record-keeping procedures. Of note, however, were the three items which concerned coordination with the classroom teachers, contact with the home, and monitoring pupil progress. In response to these questions, teachers indicated that informal contact was the primary method used for coordination with classroom teachers (100.0%); the Progress Reports (e.g. checklists, computer generated reports, etc.) were the

primary methods used to report to parents (75.0%) by middle school teachers, while Parent Conferences were the primary means used by elementary teachers (75.0%); and the Computer Management System was the primary method of monitoring pupil progress (100.0%).

Teachers also had the opportunity to comment on various facets of the program. Primary areas of concern included difficulties in getting parents to visit schools and a general lack of space in some program labs. Teachers noted that they were generally satisfied with pupil progress and that pupils had an improved attitude about math labs.

Summary

The Mathematics Improvement Component (MIC) provided supplementary instruction to selected elementary and middle school pupils who were low achievers in mathematics. The purpose of MIC was to improve mathematics skills and levels of achievement. Three programs comprised MIC: the Elementary Computer Assisted Instruction (Elem-CAI) Program, the Elementary Competency Based Education (Elem-CBE) Program, and the Middle School Competency Based Education (Middle-CBE) Program. At the elementary level, pupils were served an average of three times a week, while at the middle school level pupils were served an average of two times a week. In all programs selected pupils were permitted to move in and out of the program as needed during the school year.

Evaluation of the MIC programs included the collection of data in seven areas: (1) Pupil Census Information, (2) Standardized Achievement Test Information, (3) Potential Retainee Information, (4) Parent Involvement Information (5) Inservice Evaluation Information, (6) Computer Census Information (MIC-CAI only), and (7) Process Evaluation Information. These data were analyzed to obtain a broad measure of the programs' success, and in particular to ascertain the degree to which the programs achieved the following three desired outcomes:

> At least 50% of the pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period will gain at least 3.0 normal curve equivalent (NCE) points for the instructional period in total mathematics. Gain will be measured by a nationally standardized achievement test of mathematics.
>
> At least 50% of the pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period will gain at least 3.0 normal curve equivalent (NCE) points for the instructional period in mathematical concepts and applications. Gain will be measured by a nationally standardized test.
>
> At least 35% of the pupils who were enrolled at least 30 days and who attended the program at least 80% of their instructional period and who are identified by their classroom teacher on or before December 1, 1989 as being in danger of being retained will not be retained (grades 3-5) or as being in danger of failing the course in which mathematics instruction occurs will not fail (grades 6-8).

Elementary Computer Assisted Instruction Program (MIC-CAI)

Pupil Census Form data indicated that a total of 697 pupils in grade 3-5 were served by the 22 half-time MIC-CAI teachers in 20 elementary schools. The average number of MIC-CAI pupils served during the school year per teacher was 31.7. The average number of MIC-CAI pupils enrolled per teacher on any given day was 22.0. The average amount of instruction per week was 3.1 hours. The average

hours of instruction per week varied only slightly from grade level to grade level and ranged from 3.0 to 3.1 hours.

The evaluation sample for Total Mathematics consisted of 522 pupils in grades 3-5 who were English-speaking, met the attendance criterion, and took the pretest and posttest. Analyses of the CTBS Total Mathematics scores indicated an average change of 10.5 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in the first desired outcome. The criterion was exceeded in each grade level, with grade 3 achieving a gain of 17.2 NCEs.

For Mathematics Concepts and Applications the evaluation sample consisted of 517 pupils in grades 3-5 who were English-speaking, met the attendance criterion, and took the pretest and posttest. Analyses of the CTBS Mathematics Concepts and Applications scores indicated an average change of 5.7 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in the second desired outcome. The criterion was exceeded in two of three grade levels, with grade 5 achieving an NCE gain of only 1.3.

Early in the school year, a locally developed instrument, the Potential Retainee Record Sheet, was used to identify program pupils in danger of being retained. Teachers identified 82 (14.6%) pupils of the 560 program pupils listed, as being potential retainees. At the end of the school year, records indicated that only 13 (15.9%) of the potential retainees were actually retained. In other words, 69 of the 82 (84.1%) pupils identified, were not retained in grade, far exceeding the criterion of 35.0% specified in the third desired outcome.

Program teachers reported a total of 1311.4 contacts during the school year with 435 different parents of program pupils. The number of contacts and hours varied by month. Individual parent conferences accounted for more parent contacts than any other type of activity.

Evaluation forms were completed for the three inservice meetings. The meetings were rated highly, with the average ratings ranging from 4.6 to 4.7 on a 5-point scale, where (5) represented "Strongly Agree" and (1) represented "Strongly Disagree."

A survey of program teachers indicated that most of the elementary CAI labs had Apple microcomputers serviced by the Jostin Company. The exceptions were 2 labs that had Computer Curriculum Corporation computers and 1 lab that had the Sperry Network System that was serviced by Wasatch. According to teacher reports, the overall average amount of time pupils worked at the computer stations was 45.4% of program instructional time.

During the month of March 1990, on-site visitations and teacher interviews were conducted in 11 of 22 MIC-CAI labs as part of a process evaluation. Program teachers were observed during a classroom session, and then interviewed about different aspects of the program. The program teachers, prior to the visit, also completed a 32 item questionnaire covering nine areas deemed important to the program. Results of the evaluation indicated that program teachers thought Parent Involvement was the one area most in need of improvement. Other areas, such as Class Scheduling and Materials Provided for Program received very positive ratings from teachers. In the classroom, the most frequently observed instructional activities were Doing Computer Activities and Working on Drill and Practice. The primary method of monitoring pupil progress was the Computer Management System employed by program teachers, and the Progress Report was the most frequently employed method of reporting to parents.

Elementary and Middle School Competency Based Education Program (MIC-CBE)

The MIC-CBE program was implemented by 22 teachers serving a total of 23 school, 11 at the elementary level and 12 at the middle school level. One teacher served half-time at two elementary schools. Pupil Census Form data indicated that a total of 1353 pupils in grades 3-8 were served in the MIC-CBE program. Of the 1353 pupils, 522 were in elementary schools and 831 were in middle schools. The average number of pupils served during the school year per teacher was 61.5. The average number of pupils enrolled per teacher on any given day was 23.6. The average amount of instruction per week was 1.7 hours. The average hours of instruction per week varied by grade level and ranged from 1.4 hours for grades 6-8, to 2.2 hours for grade 4.

The evaluation sample for Total Mathematics consisted of 585 pupils in grades 3-8 who were English-speaking, met the attendance criterion, and took the pretest and posttest. Analyses of the CTBS Total Mathematics scores indicated an average change of 11.0 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in the first desired outcome. The criterion was exceeded in each grade level, with grade 3 achieving a gain of 20.3 NCEs. The smallest gain was achieved at grade 8, with 3.9 NCEs.

The Mathematics Concepts and Applications evaluation sample consisted of 584 pupils in grades 3-8 who were English-speaking, met the attendance criterion, and took the pretest and posttest. Analyses of the CTBS Mathematics Concepts and Applications scores indicated an average change of 7.4 NCE points. Results exceeded the evaluation criterion for mathematics growth of 3.0 NCE points specified in the second desired outcome. The criterion was exceeded at all but two grade levels. The greatest gain was achieved at grade 3, with 16.2 NCEs. Grades 5 and 8 achieved only small gains of 0.9 NCEs and 2.4 NCEs respectively.

Early in the school year, two locally developed instruments, the Potential Retainee Record Sheet at the elementary level, and the Potential Course Failure Record Sheet at the middle level, were used to identify program pupils in danger of being retained/failed. Teachers identified 189 pupils or 29.6% of the 638 program pupils listed, as being potential retainees/course failures. At the end of the school year, records indicated that 59 or 31.2% of the potential retainees were actually retained. In other words, 130 of the 189 pupils identified, or 68.8%, were not retained in grade or failed, far exceeding the criterion of 35.0% specified in the third desired outcome.

Program teachers reported a total of 1651.0 contacts during the school year with 739 different parents of program pupils. The number of contacts and hours varied by month. Individual parent conferences accounted for more parent contacts than any other type of activity.

Evaluation forms were completed for the three inservice meetings. The meetings were rated highly, with the average ratings ranging from 4.6 to 4.8 on a 5-point scale, where (5) represented "Strongly Agree" and (1) represented "Strongly Disagree."

During the month of March 1990, on-site visitations and teacher interviews were conducted in eight of 10 MIC-Elementary-CBE labs and all 12 MIC-Middle-CBE labs as part of a process evaluation. The same instrument and procedures were used as had been employed in the MIC-CAI labs. The results of the evaluation were also similar to those found in the MIC-CAI program. Again program teachers clearly rated the area of Parent Involvement lower than all other areas. Other areas received generally favorable ratings. The most frequently observed instructional activities observed in the MIC-CBE classrooms were Doing Computer

Activities at the elementary level, and Reviewing and Strengthening Specific Skills and/or Concepts at the middle school level. In all classrooms, Informal Contact was the primary method of coordination with classroom or subject area teachers. The primary method used to report to parents was the Parent Conference at the elementary level, and Progress Reports at the middle school level. The primary method used to monitor pupil progress was the Computer Management System at both elementary and middle school levels.

Recommendations

Based on the 1989-90 evaluation results for both the MIC-CAI and the MIC-CBE programs, the following recommendations are in order:

1. The standardized test scores indicated a slightly greater achievement gain at grades 3 and 4 for the MIC-CBE pupils. At grade 5, the MIC-CAI pupils showed a slightly greater achievement gain than MIC-CBE pupils. However it is difficult to draw conclusions comparing the two programs' effectiveness without a controlled study which takes into account variations in program implementation (e.g., the use of different types of instructional methods, computer equipment, the percent of pupil time using computers). Such an examination is recommended to determine the most effective methods of improving the skills and achievement levels of pupils who are low achievers in mathematics.

2. Achievement test data indicate that program pupils are making gains in improving their skills in mathematics. It is recommended that Mathematics Improvement Programs, in some form, should be continued.

3. Special efforts need to be made to improve the achievement levels of the program pupils who showed "no improvement" from pretest to posttest on the standardized achievement test.

4. Program teachers should involve themselves as much as possible as proctors in the standardized achievement test administration.

5. Program teachers should meet with classroom teachers on a regular basis for planning instructional strategy.

6. The nature and amount of movement in and out of the program should be determined because it is a key aspect of the program.

7. Methods for encouraging parent involvement should be actively sought and successful methods shared.

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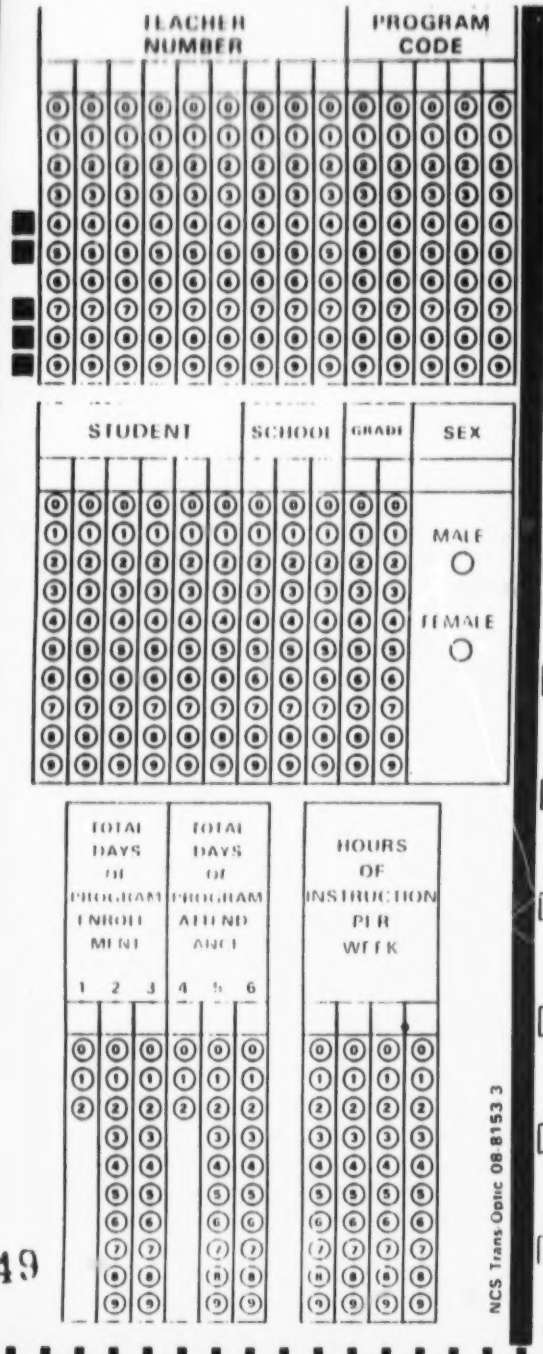
Appendix A

Instruments



TEACHER NUMBER

PROGRAM CODE

STUDENT

SCHOOL

GRADE

SEX

MALE

FEMALE

TOTAL DAYS OF PROGRAM ENROLLMENT 1 2 3

TOTAL DAYS OF PROGRAM ATTENDANCE 4 5 6

HOURS OF INSTRUCTION PER WEEK

NCS Trans Optic 08-8153-3

49

COLUMBUS PUBLIC SCHOOLS - Columbus, Ohio **PUPIL CENSUS FORM**

LAST NAME _____ FIRST NAME _____ M I _____ SEX _____ TEACHER NUMBER _____

SCHOOL _____ H R _____ GRADE _____

USE A NUMBER 2 PENCIL. ERASE COMPLETELY WHEN MAKING CORRECTIONS.

WAS THIS A "NON-ENGLISH SPEAKING" STUDENT?

YES * NO *

DID THIS PUPIL BECOME QUALIFIED FOR A SPECIAL ED. PROGRAM?

YES * NO *

HOW DID YOU FEEL THIS PUPIL PROGRESSED WHILE IN YOUR PROGRAM?

MUCH PROGRESS * SOME PROGRESS * LITTLE PROGRESS * NO PROGRESS *

50

CHAPTER 1 EVALUATION
PARENT INVOLVEMENT SURVEY

mailing label
goes here

Name _____

School _____

For the month of MAY

DIRECTIONS:
1. Complete all information according to the instructions, fold over so back is showing, staple, and place in school mail.
2. Place a parent in only one activity for any one meeting.
3. Total hours (Column B) equals the number of parents times the number of hours spent, e.g., a group meeting for 10 parents which lasts 3 hours would result in 10 parents (Column A) and 30.0 hours (Column B), 15 parent conferences each for 30 minutes would result in 15 parents and 7.5 hours. Please round all figures in Column B to the nearest half hour. Enter half hours as .5, no fractions please.
4. Item 6 - This is the number of different parents seen during the month. If you had 16 parent conferences but 10 conferences were with the same parent, the number is 7 parents - you saw 7 parents but had 16 conferences. Do not count the same parent more than once for the month.

	(A) Number of Parents	(B) Total Number of Hours
1. Parents involved in the planning, operation, and/or evaluation of your unit	_____	____.__
2. Group Meetings for Parents	_____	____.__
3. Individual Parent Conferences (include phone conferences)	_____	____.__
4. Parental Classroom Visits or Field Trips	_____	____.__
5. Visits by you to Parent Homes	_____	____.__
6. Number of different parents seen during the month	_____	

PLEASE PUT IN SCHOOL MAIL NO LATER THAN FRIDAY, JUNE 1, 1990

Mailing Label Here

CHAPTER 1 EVALUATION
PARENT INVOLVEMENT SURVEY

CHAPTER 1 ANNUAL PARENT COUNT

Enter in the box to the left the number of different parents you had involved this school year. COUNT EACH PARENT ONLY ONCE FOR THE YEAR. If you have questions, please call Jane Williams at 365-5167.

COMPLETE THE REST OF THIS REPORT FOR JUNE ONLY

DIRECTIONS:

1. Complete all information according to the instructions, fold over so back is showing, staple, and place in school mail.
2. Place a parent in only one activity for any one meeting.
3. Total hours (Column B) equals the number of parents times the number of hours spent, e.g., a group meeting for 10 parents which lasts 3 hours would result in 10 parents (Column A) and 30.0 hours (Column B), 15 parent conferences each for 30 minutes would result in 15 parents and 7.5 hours. Please round all figures in Column B to the nearest half hour. Enter half hours as .5, no fractions please.
4. Item 6 - This is the number of different parents seen during the month. If you had 16 parent conferences but 10 conferences were with the same parent, the number is 7 parents - you saw 7 parents but had 16 conferences. Do not count the same parent more than once for the month.

Activities	(A) Number of Parents	(B) Total Number of Hours
1. Parents involved in the planning, operation, and/or evaluation of your unit	_____	____.__
2. Group Meetings for Parents	_____	____.__
3. Individual Parent Conferences (include phone conferences)	_____	____.__
4. Parental Classroom Visits or Field Trips	_____	____.__
5. Visits by you to Parent Homes	_____	____.__
6. Number of different parents seen during the month	_____	

PLEASE PUT IN SCHOOL MAIL NO LATER THAN FRIDAY, JUNE 1, 1990

EVALSRVCS/P514/RPTFMIC90

ESEA CHAPTER 1 AND DPPF
ORIENTATION INSERVICE EVALUATION FORM
1989-90 ORIENTATION

Date of Orientation Meeting _____ A.M. ___ P.M. ___

Circle only the program(s) you are in:

ESEA Chapter 1 Programs:
(1) ADK
(2) CLEAR-Reading Recovery
(3) CLEAR Non-Public (1-8)
(4) CLEAR-Primary-Whole Language (2-3)
(5) CLEAR-Elementary Regular (2-5)
(6) CLEAR-Elementary-CAI (3-5)
(7) CLEAR-Middle Regular (6-8)
(8) CLEAR-Middle-CAI (6-8)
(9) MIC-Elementary-CAI (3-5)
(10) MIC-Elementary-CBE (3-5)
(11) MIC-Middle-CBE (6-7)

DPPF Programs:
(12) Secondary Reading (Regular)
(13) Secondary Reading (CAI)
(14) HSCA

Other (Specify)
(15) _____

Circle the number that indicates the extent to which you agree with statements 1-4, in rating the overall day of inservice.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. I think this was a very worthwhile inservice.	5	4	3	2	1
2. The information presented in this inservice will assist me in my program.	5	4	3	2	1
3. There was time to ask questions pertaining to the presentations.	5	4	3	2	1
4. Questions were answered adequately.	5	4	3	2	1

Circle the number that indicates how you would rate each of the following portions of today's inservice in regard to interest and usefulness of presentations.

	Superior	Excellent	Good	Fair	Poor
5. Program Coordinators' Presentation					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1
c. Clarity of instructions	5	4	3	2	1

****
*
* Please turn over for questions 6-9 *
*
****

	Superior	Excellent	Good	Fair	Poor
6. Evaluation Presentation					
a. Interest	5	4	3	2	1
b. Usefulness	5	4	3	2	1
c. Clarity of instructions	5	4	3	2	1

7. What was the most valuable part of this meeting?_____

_____

8. What was the least valuable part of this meeting?_____

_____

9. What additional information or topics would you like to see covered in future meetings?

_____

_____

_____

GENERAL INSERVICE EVALUATION FORM
1989-90

Inservice Topic: _____

Presenter(s): _____

Date: ____/____/____ (e.g., 03/05/90)
MM DD YY

Session (Check only one): ____ all day ____a.m. ____ p.m.

Circle only the program(s) you are in:

ESEA Chapter 1 Programs:
(1) ADK
(2) CLEAR-Reading Recovery
(3) CLEAR-Non-Public (1-8)
(4) CLEAR-Whole Language
(5) CLEAR-Elementary-Regular (2-5)
(6) CLEAR-Elementary-CAI (3-5)
(7) CLEAR-Middle-Regular (6-8)
(8) CLEAR-Middle-CAI (6-8)
(9) MIC-Elementary-CAI (3-5)
(10) MIC-Elementary-CBE (3-5)
(11) MIC-Middle-CBE (6-7)

DPPF Programs:
(12) Secondary Reading Program (Regular)
(13) Secondary Reading Program (CAI)
(14) HSCA

Other (Specify)
(15) _____

Circle the number that indicates the extent to which you agree or disagree with statements 1-4.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. I think this was a very worthwhile meeting.	5	4	3	2	1
2. The information presented in this meeting will assist me in my program.	5	4	3	2	1
3. There was time to ask questions pertaining to the presentation.	5	4	3	2	1
4. Questions were answered adequately.	5	4	3	2	1

5. What was the most valuable part of this meeting? _____

_____

6. What was the least valuable part of this meeting? _____

_____

7. Please list any additional information or topics you would like to see covered in future meetings. a) _____

b) _____

c) _____

EVALSRVCS/P514/RPTFMIC90

Columbus Public Schools
Department of Program Evaluation
Process Evaluation

COMPUTER CENSUS FORM
FOR DPPF AND ESEA CHAPTER 1 PROGRAMS
USING COMPUTER ASSISTED INSTRUCTION (CAI)

Teacher _____ School _____

1. Please give the **number** of Computers or Terminals in your lab, by Type.

___Apple
___TRS-80 Color
___TRS-80 Black and White
___Tandy 1000-SL
___Tandy-3000
___Tandy-4000
___Other Tandy _____
___Acer
___Dolphin
___Sperry
___AT&T
___Atari
___Wicat
___PET
___Other_____
___Other_____
___Other_____

2. Please check the company servicing the computers.

___Jostin
___B&B
___Wasatch
___CCC
___Wicat
___Other _____

3. Please check the type of lab you have.

___Apple lab
___ILA lab
___Tandy lab
___Networked Tandy Lab
___Sperry Network System
___CCC Microhost lab
___Dolphin lab
___Wicat Systems lab
___Other _____

4. Does your computer system include a command module/teacher management system? ___Yes ___No

5. Can the command module also be used as a pupil station? __Yes __No __NA

6. How many computers (or terminals) are available in your lab for pupil work (do not include the Command Module)? _____

7. What is the average number of minutes per week a pupil is served in the program?

_____ (Reading program pupils) _____ (Math program pupils)

8. What is the average number of minutes per week a pupil works at a computer?

_____ (Reading program pupils) _____ (Math program pupils)

9. Additional comments:_____

_____

DPE 2/90

Columbus Public Schools
Department of Program Evaluation
Process Evaluation

EVALUATOR'S VISITATION LOG
FOR DPPF-SRP AND ESEA CHAPTER 1 PROGRAMS
1989-90

___ CLEAR-Elem	___ CLEAR-Elem-CAI	___ MIC-Elem-CAI
___ CLEAR-Mid	___ CLEAR-Mid-CAI	___ MIC-Elem-CBE
___ SRP (Regular)	___ SRP-CAI	___ MIC-Mid-CBE

School: _____ Date: _____ Time: from _____ to _____

Program Teacher: _____ Evaluator: _____

Grade(s) Observed: _____ Number of Pupils in Class: _____

General Directions: This instrument consists of two sections, a Teacher's Rating Scale with space for optional comments and an Evaluator's Observation Log. In addition a brief interview will be conducted either before or after the observation, whichever is more convenient. The teacher should complete the Teacher's Rating Scale (Section A) prior to the evaluator's visit and present the entire instrument to the evaluator at the time of visitation. The evaluator will complete the interview notes and Evaluator's Observation Log (Section B) during the course of the visitation.

SECTION A: TEACHER'S RATING SCALE AND INTERVIEW NOTES

Directions: Please complete this section prior to the evaluator's visit by rating the following aspects of your program. Circle the number in each item that most closely corresponds to your rating of the item on a scale where the highest rating is 5 and the lowest rating is 1 (no fractions, please). Please respond to all rating scale items in Section A.

Pupil Progress

1.	The overall progress of this year's pupils	Excellent 5	4	3	2	Very Poor 1
2.	Share Progress of Pupils with Classroom and/or Content Area Teacher	Very Frequent 5	4	3	2	Very Infrequent 1

Teacher's Optional Comments _____
_____
_____
_____

Parent Involvement

3.	Response to Efforts to Involve	Very Responsive 5	4	3	2	Very Unresponsive 1
4.	Change in Positive Pupil Behavior due to Parent Involvement	Very Much 5	4	3	2	None 1

5. Frequency of Reporting Pupil Progress to Parents During a Quarter

(5) 10 or More Times
(4) 7 to 9 Times
(3) 4 to 6 Times
(2) 1 to 3 Times
(1) Less Than 1 Time

Teacher's Optional Comments _____

Coordination with Classroom Teacher

6.	Cooperation of Classroom Teacher	Very Cooperative 5	4	3	2	Not at All Cooperative 1
7.	Effectiveness of Coordination	Very Effective 5	4	3	2	Not at All Effective 1

8. Frequency of Joint Planning During a Quarter

(5) 10 or More Times
(4) 7 to 9 Times
(3) 4 to 6 Times
(2) 1 to 3 Times
(1) Less Than 1 Time

Teacher's Optional Comments _____

Selection Process

9. Selection Test Choice	Excellent 5	4	3	2	Very Poor 1
10. Problems	None 5	4	3	2	Many 1
11. Procedures	Very Simple 5	4	3	2	Very Complex 1
12. Time Required	Very Reasonable 5	4	3	2	Very Unreasonable 1

Teacher's Optional Comments _____

Class Scheduling

13. Administrative Cooperation	Excellent 5	4	3	2	Very Poor 1
14. Teacher Cooperation	5	4	3	2	1
15. Class Size	5	4	3	2	1

Teacher's Optional Comments _____

Testing: Achievement Measure (CTBS)

16. Choice of Test	Excellent 5	4	3	2	Very Poor 1
17. Problems	None 5	4	3	2	Many 1
18. Procedures	Very Simple 5	4	3	2	Very Complex 1
19. Test Scheduling	Very Easy 5	4	3	2	Very Difficult 1
20. Time Required	Very Reasonable 5	4	3	2	Very Unreasonable 1

Teacher's Optional Comments _____

Evaluation Feedback

21. Quantity	Very Adequate 5	4	3	2	Very Inadequate 1
22. Information	Very Useful 5	4	3	2	Of No Use 1
23. Time Factor	Very Timely 5	4	3	2	Very Untimely 1

Teacher's Optional Comments _____

_____

_____

_____

Materials Provided for Program

24. Amount	Very Adequate 5	4	3	2	Very Inadequate 1
25. Levels	Very Appropriate 5	4	3	2	Very Inappropriate 1
26. Condition	New 5	4	3	2	Old 1

Teacher's Optional Comments _____

_____

_____

_____

Facilities

27. Space	Excellent 5	4	3	2	Very Poor 1
28. Light	5	4	3	2	1
29. Temperature/Ventilation	5	4	3	2	1
30. Noise Level	5	4	3	2	1
31. Furniture	5	4	3	2	1
32. Storage	5	4	3	2	1

Teacher's Optional Comments _____

_____

_____

_____

Columbus Public Schools
Department of Program Evaluation
Process Evaluation

EVALUATOR'S VISITATION LOG
FOR DPPF-SRP AND ESEA CHAPTER 1 PROGRAMS
1989-90

SECTION B: EVALUATOR'S OBSERVATION LOG (MIC)

Directions for Evaluator: Check (X) all pupil activities observed during the visit.

Activities in Lab

___ 1. Working with Calculators

___ 2. Reviewing Prior Knowledge with Teacher and Filling in Background Needed for Lesson with Teacher Guidance

___ 3. Working Math Puzzles

___ 4. Working on Drill and Practice Exercises

___ 5. Solving Story Problems

___ 6. Using Manipulatives to Bettter Understand a Math Concept

___ 7. Reviewing and Strengthening Specific Skills and/or Concepts

___ 8. Working at Learning Centers

___ 9. Watching Demonstrations or Doing Experiments

___10. Doing Computer Activities

___11. Participating in a Small Group Discussion

___12. Working Problems at the Chalk Board

___13. Using Play Money

___14. Participating in Timed Skill Drill Marathon

___15. Test Taking

___16. Other

Columbus Public Schools
Department of Program Evaluation
Process Evaluation

EVALUATOR'S VISITATION LOG
FOR DPPF-SRP AND ESEA CHAPTER 1 PROGRAMS
1989-90

SECTION C: EVALUATOR'S ADDITIONAL INTERVIEW ITEMS

Evaluator's Directions: The evaluator should concentrate on the following areas in the course of the interview.

Rating Scale with Teacher's Optional Comments

Look over the Rating Scale previously completed by the teacher and inquire about any areas that seem to require further clarification.

Selection Procedures

	Yes	No	NA
1. Program guidelines for selecting pupils are followed.	____	____	____

Record Keeping

	Yes	No	NA
2. Pupil personal data and attendance are recorded on DFSP Student Data Sheets or alternative form/method.	____	____	____
3. Teacher understands procedures for recording attendance and enrollment on DFSP Student Data Sheet (including special guidelines for CLEAR-Elem-CAI and the MIC programs).	____	____	____
4. Correct procedures are followed in completing PCFs.	____	____	____

Record Keeping (Cont'd)

	Yes	No	NA
5. Add Forms			
a. Are Add Forms up-to-date?	____	____	____
b. Are more Add Forms needed?	____	____	____

Coordination with Classroom Teachers

6. What primary method(s) do you use for coordination with classroom and/or subject area teachers? Check all that apply.

____Scheduled Meetings
____Written Communication
____Informal Contact
____Information from Pupils
____Other_____

Contact with the Home

7. What primary method(s) do you use for reporting to parents? Check all that apply.

____Parent Conferences (School or Home Visits)
____Telephone Calls
____Written Notes
____Progress Reports (e.g. checklists, computer generated reports, etc.)
____Grade Cards
____Newsletters
____Parental Supervised Homework
____Other_____

Monitoring of Pupil Progress

8. What primary method(s) do you use to monitor pupil progress? Check all that apply.

___Individual Work Folders
___Conferences with Pupils
___Checklists
___Graphs and/or Charts
___Assignment Sheets
___Tests and/or Quizzes
___Computer Management System
___Chalkboard Exercises
___Oral Activities
___Homework Assignments
___Other_____

Appendix B

Additional Tables

Table B-1

Minimum, Maximum, Median, and Standard Deviation of the Pretest and Posttest Percentiles for MIC-CAI Program in Total Mathematics Reported by Grade Level 1989-90

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Percentile	Standard Deviation	Min.	Max.	Median Percentile	Standard Deviation
3	140	1.0	79.0	16.0	15.6	1.0	96.0	37.5	24.9
4	220	1.0	87.0	17.0	11.2	1.0	94.0	27.0	18.1
5	162	1.0	66.0	23.0	10.6	2.0	93.0	33.0	19.9
Total	522	1.0	87.0	19.0	12.5	1.0	96.0	31.0	21.2

Table B-2

Minimum, Maximum, Median, and Standard Deviation of the
Pretest and Posttest Percentiles for MIC-CAI Program
in Mathematics Concepts and Applications Reported by Grade Level
1989-90

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Percentile	Standard Deviation	Min.	Max.	Median Percentile	Standard Deviation
3	139	1.0	75.0	13.0	15.8	1.0	97.0	32.0	20.6
4	220	1.0	89.0	23.0	14.0	1.0	90.0	27.0	18.2
5	158	1.0	85.0	28.0	14.1	2.0	89.0	25.0	18.7
Total	517	1.0	89.0	21.0	15.0	1.0	97.0	28.0	19.2

Table B-3

Minimum, Maximum, Median, and Standard Deviation of the Pretest and Posttest Percentiles for MIC-CBE Program in Total Mathematics Reported by Grade Level 1989-90

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Percentile	Standard Deviation	Min.	Max.	Median Percentile	Standard Deviation
3	81	1.0	66.0	15.0	14.9	2.0	92.0	45.0	22.1
4	101	1.0	66.0	18.0	12.1	2.0	89.0	29.0	17.7
5	85	2.0	80.0	24.0	13.5	1.0	91.0	39.0	23.8
6	170	1.0	74.0	20.0	11.7	1.0	86.0	30.0	22.3
7	130	1.0	45.0	16.0	9.0	1.0	98.0	33.5	19.3
8	18	13.0	31.0	21.5	5.5	19.0	42.0	28.5	6.5
Total	585	1.0	80.0	19.0	12.1	1.0	98.0	34.0	21.3

Table B-4

Minimum, Maximum, Median, and Standard Deviation of the
Pretest and Posttest Percentiles for MIC-CBE Program
in Mathematics Concepts and Applications Reported by Grade Level
1989-90

Grade	Number of Pupils	Pretest				Posttest			
		Min.	Max.	Median Percentile	Standard Deviation	Min.	Max.	Median Percentile	Standard Deviation
3	82	1.0	99.0	15.5	17.2	1.0	93.0	40.0	22.0
4	103	1.0	69.0	25.0	14.3	1.0	90.0	27.0	17.8
5	81	9.0	85.0	31.0	12.6	2.0	92.0	37.0	22.0
6	170	2.0	78.0	16.0	14.5	1.0	81.0	27.0	19.3
7	130	1.0	57.0	15.0	11.5	1.0	97.0	36.5	20.2
8	18	8.0	41.0	18.5	9.6	9.0	50.0	26.0	10.0
Total	584	1.0	99.0	19.0	14.4	1.0	97.0	30.0	20.4